Lesson Topic 1.4

WATERTIGHT CLOSURES INSPECTION AND MAINTENANCE

Introduction

Enabling Objectives

- Describe safety precautions involved with Watertight Closures Inspection, Maintenance and Repair in accordance with DAMAGE CONTROL WATERTIGHT CLOSURES INSPECTION, MAINTENANCE and PMS requirements.
- Describe the procedures for inspection on watertight doors in accordance with DAMAGE CONTROL WATERTIGHT CLOSURES INSPECTION, MAINTENANCE AND REPAIR BOOKLETand PMS requirements

Enabling Objectives

- Perform inspection on a Quick Acting Watertight Door in accordance with DAMAGE CONTROL WATERTIGHT CLOSURES INSPECTION, MAINTENANCE AND REPAIR BOOKLET and PMS requirements
- Describe the procedures for maintenance of watertight doors in accordance with DAMAGE CONTROL WATERTIGHT CLOSURES INSPECTION, MAINTENANCE AND REPAIR BOOKLET

Enabling Objectives

- Perform maintenance on a Quick Acting Watertight Door in accordance with DAMAGE CONTROL WATERTIGHT CLOSURES INSPECTION, MAINTENANCE AND REPAIR BOOKLET
- Describe the procedures for inspection of watertight hatches and scuttles in accordance with DAMAGE CONTROL WATERTIGHT CLOSURES INSPECTION, MAINTENANCE AND REPAIR BOOKLET and PMS requirements

Enabling Objectives

- Perform inspection on a Quick Acting Watertight Scuttle in accordance with DAMAGE CONTROL WATERTIGHT CLOSURES INSPECTION, MAINTENANCE AND REPAIR BOOKLET and PMS requirements

Watertight Closures Safety Precautions

- Before starting repairs on any watertight fitting permission must be obtained form your chain of command.
  - **Do not** disassemble any watertight fitting while vessel is underway, and perform only emergency repairs needed to keep the fitting operational.
  - **Do no** totally disassemble a hatch, scuttle or door that is below the waterline because of warn bushings.
  - If a hatch or scuttle cover is removed for repairs, rope off and cover the area.
  - Exercise common sense

General guidance for inspections

- Comply with Navy Safety Precautions for Forces Afloat, OPNAVINST 5100 series
- All tag-out procedures shall be in accordance with current shipboard instructions.
- Do inspection and maintenance in accordance with PMS and Watertight Closures Inspection, Maintenance and Repair Booklet.
- Loose, missing or damaged parts showing excessive wear must all be replaced.

General guidance for inspections

- Doors, hatches and scuttles should routinely be inspected by DCPOs, work center supervisors and zone inspectors for:
  - Loose, missing and damaged parts
  - Paint, rust or other foreign matter on gaskets, knife edges and working parts.
  - Binding and difficult operations
  - Distortion and deterioration of metal surfaces
  - Hinge pin wear and pins that are not properly secured.
  - Gasket cracks, deterioration, hardness, permanent set over 1/8 inch deep and gaps where the gasket ends meet.
  - No more than two joints in gaskets.
  - Gaskets must be no less than 24 inches in length.

General guidance for inspections

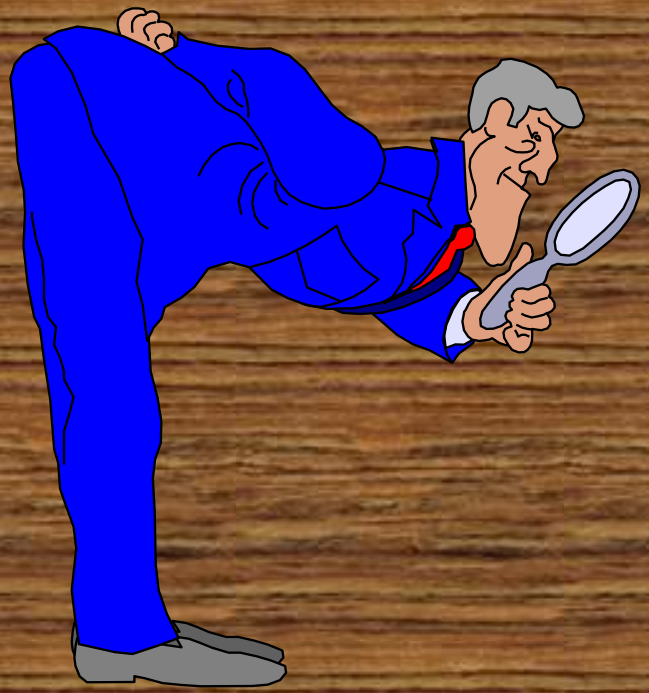
- Doors, hatches and scuttles should routinely be inspected by DCPOs, work center supervisors and zone inspectors for:
  - Obstructed access to escape scuttles.
  - Packing plungers intact and stick packing adequate (except on closures with self-lubricated bushings)
  - Broken or missing spring clips.
  - Missing special purpose wrenches:
    - dogging wrenches
    - T-wrenches
    - engineer's wrench (1-5/16 inch)

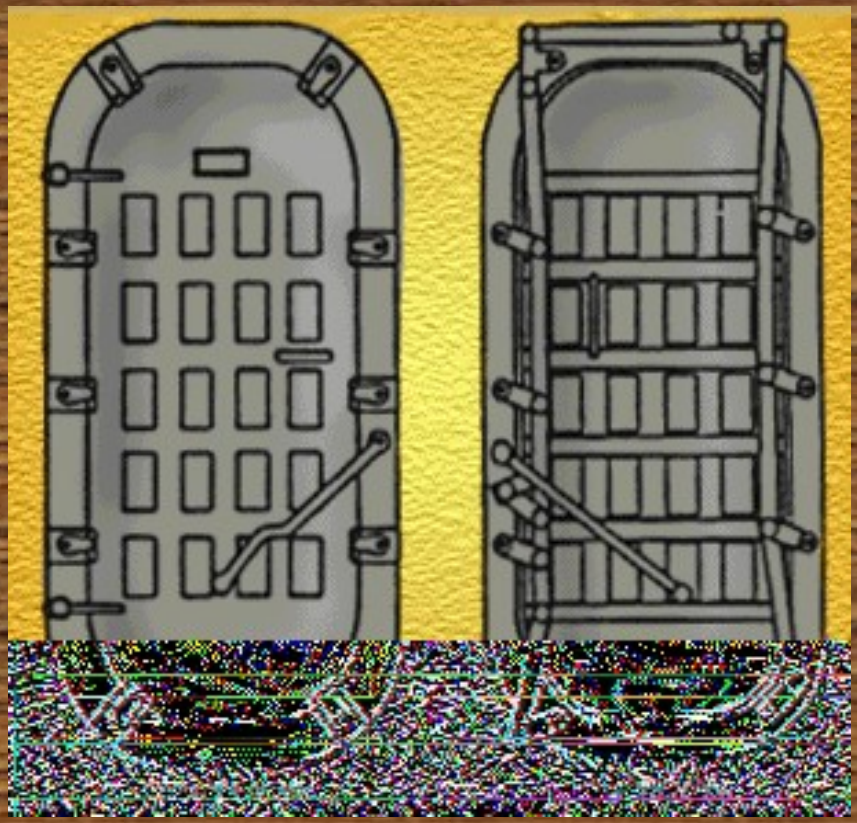
Watertight Door Inspection

NOTE: The difference between aluminum and steel wa
door is that on aluminum doors there is a dielectric ba
matting surfaces between door panel and the dog wed
scuff plate, and label plate. Teflon gasket tape should b
installed between the door panel and the dog wedges a
plate. The dielectric barrier should be trimmed 1/4 inc
than the dog wedge or scuff plate.

Quick Acting Watertight Door Inspection

LAB



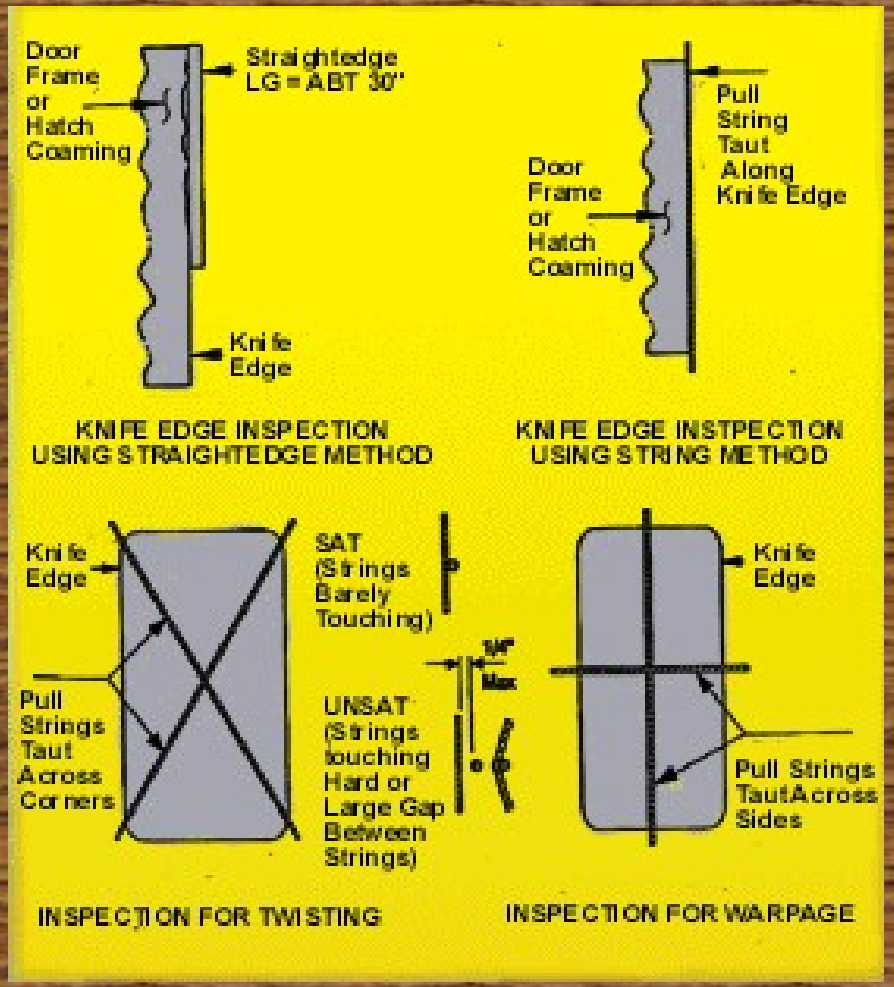


Watertight Door Maintenance

- If chalk line is not continuous, either the dogs and/or hinges are out of adjustment, or the knife edge is damaged.
- Inspect the knife edge and door frame for damage.
- Open the fitting
- Inspect the knife edge for straightness and/or warpage using a straightedge and two lengths of string. If chalk line is not continuous, either the dogs and/or hinges are out of adjustment, or the knife edge is damaged.

Watertight Door Maintenance

- The maximum acceptable variation for knife edge straightness is plus or minus 1/8 inch.
- The maximum acceptable warpage of the door frame is 1/4 inch.
- If frame/coaming warpage is excessive, or the knife edge straightness is not within tolerance, initiate replace the closure.


Door Frame or Hatch Coaming
Straightedge LG = ABT 30"
Knife Edge
KNIFE EDGE INSPECTION USING STRAIGHTEDGE METHOD
Door Frame or Hatch Coaming
Pull String Taut Along Knife Edge
KNIFE EDGE INSTPECTION USING STRING METHOD
Knife Edge
Pull Strings Taut Across Corners
SAT (Strings Barely Touching)
UNSAT (Strings touching Hard or Large Gap Between Strings)
1/4" Max
INSPECTION FOR TWISTING
Knife Edge
Pull Strings TautAcross Sides
INSPECTION FOR WARPAGE

Watertight Door Maintenance

- Inspect the knife edge for paint, dirt, rust or nicks.

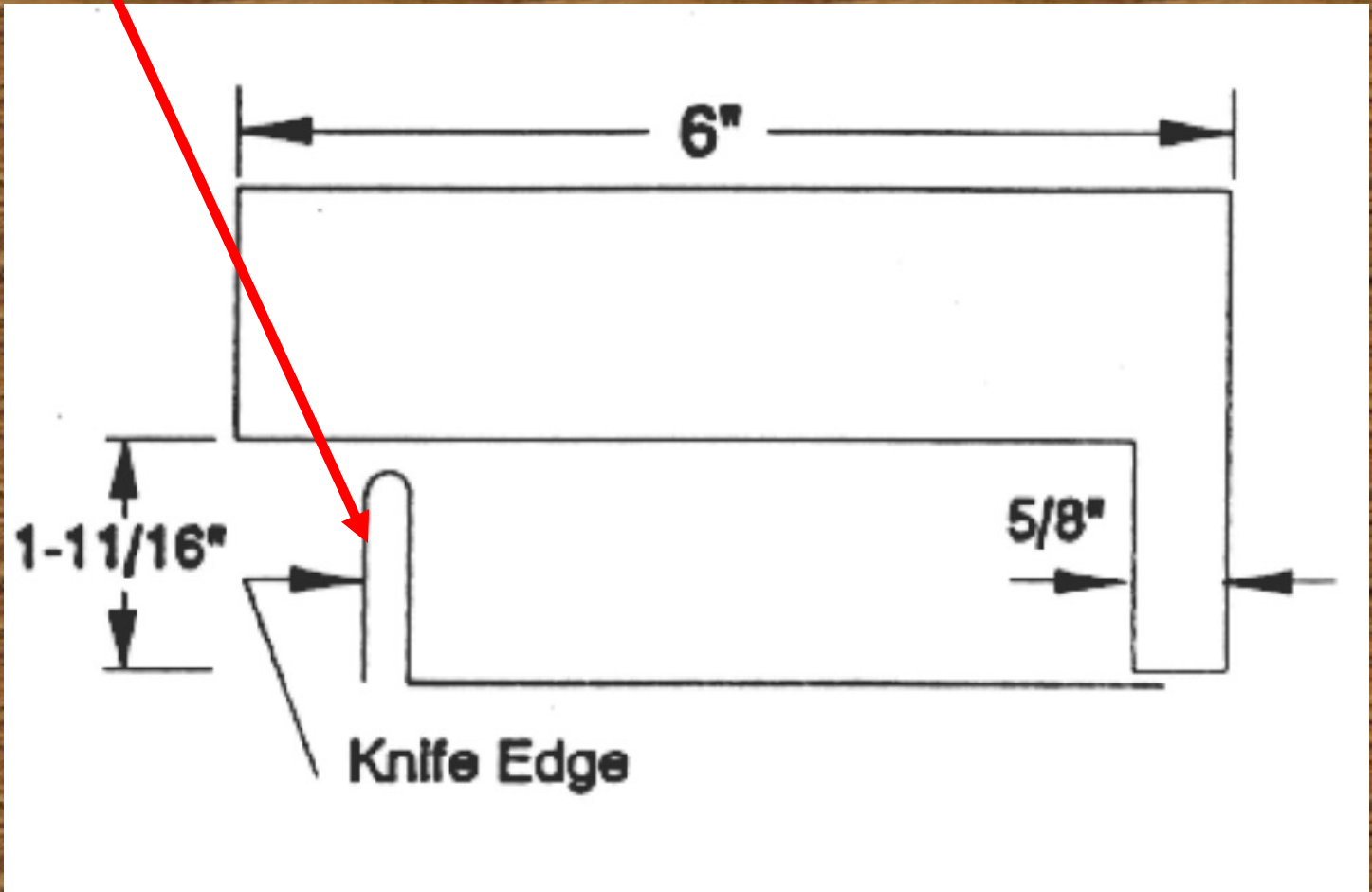
NOTE: For steel knife edges, remove paint and rust with #320 grit aluminum oxide abrasive cloth.

- Be sure to remove the abrasive grit with a clean rag to prevent the grit from getting embedded in the gasket.

CAUTION: For aluminum knife edges, remove paint with a nylon scrubbing pad and rag only.

Watertight Door Maintenance

Inspect the entire knife edge for proper height



Watertight Door Maintenance

Inspect hinge sleeves and hinge pins for wear

- With the door opened, grasp the door from the hand lever side and push it towards the hinged side. The door should not give more than approximately 3/16 inch.

- If it does, either the hinge pins and/or washers are worn, or the holes for the hinge pins have become

NOTE: Do not confuse hinge pin wear with normal pla
hinge blades.

Watertight Door Maintenance

- Another indication of hinge pin wear is if the metal channel surrounding the gasket on the door side is rubbing against the knife edge, or if the door panel rubs one or more side dogs when opening and closing.

Watertight Door Maintenance

- Replace the hinge pin washers and/or pins if any of the following condition exist:
  - The metal surrounding the top and bottom of the door gasket rubs against the knife edge.
  - The door panel rubs one or more dogs, particularly at the bottom of the door.
  - The door chafes the knife edge when you open and close it.
  - The hinge pin washers are worn thin to approximately 1/32 inch.
  - The hinge pin is bent or damaged.

NOTE: New washers are 1/16 inch in thickness.

Watertight Door Maintenance

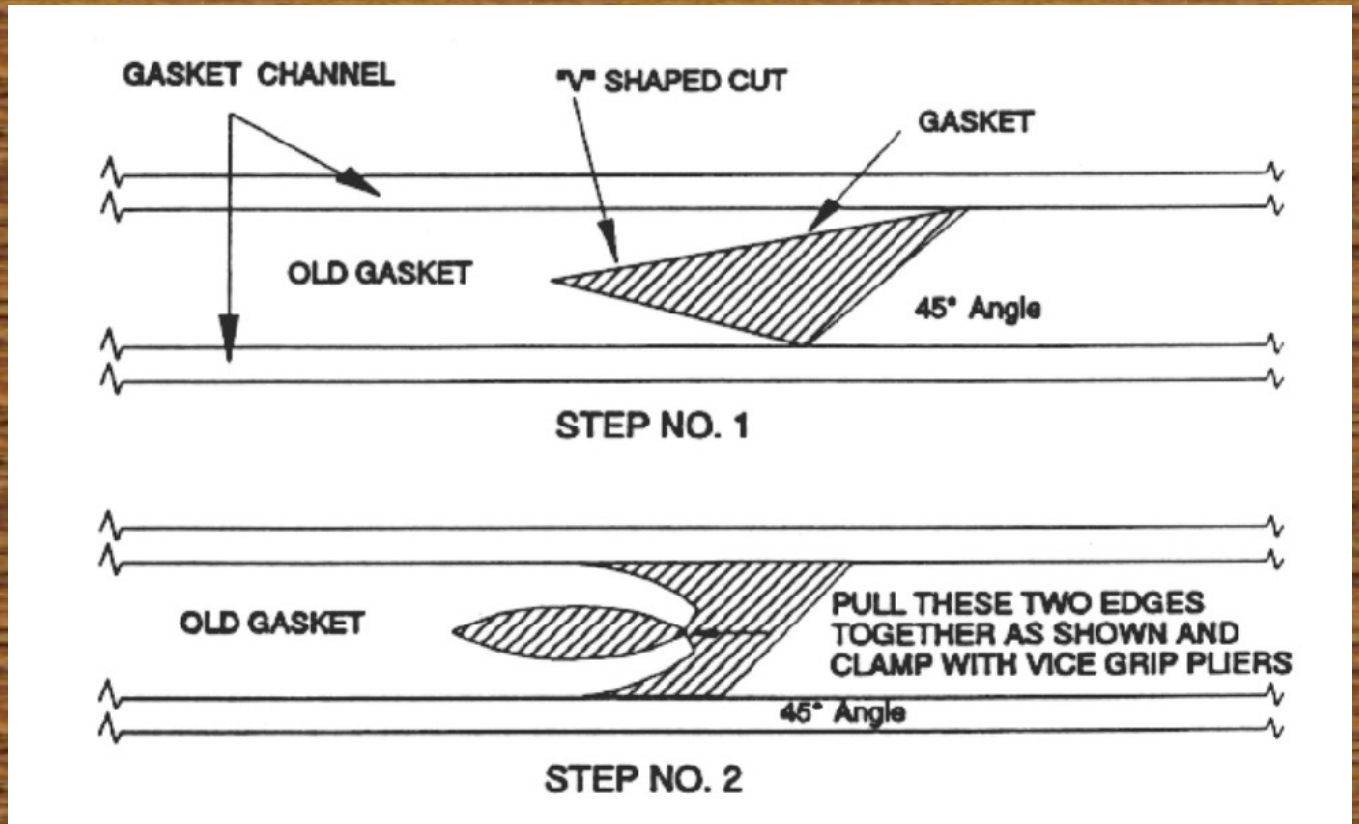
Gasket replacement

- You will replace the gasket if one of the following conditions exist:
  - Not soft and pliable
  - Has cracks
  - Gaps in the gasket joint
  - Permanent set or grove in the rubber, greater than 1/8 inch

Watertight Door Maintenance

Gasket replacement procedures

- Locate the gasket joint



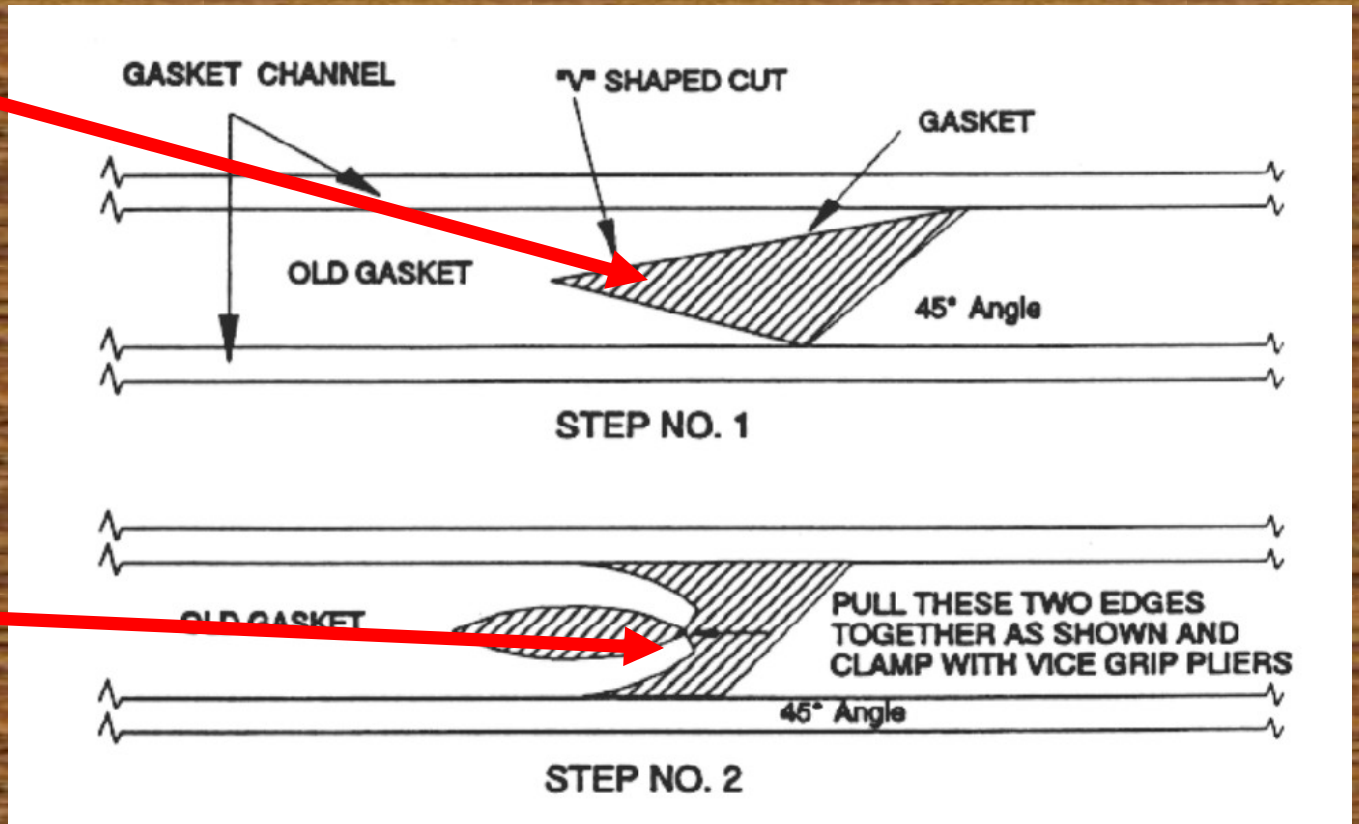
Watertight Door Maintenance

Gasket replacement procedures

NOTE:Gasket joint should be located on the top.

Cut

Pull



Watertight Door Maintenance

Gasket replacement procedures

WARNING:EXERCISE EXTREME CAUTION WHEN WORKING WITH KN

WARNING:BE CAREFULL NOT TO PU ON THE GASKET IN A DIRECT LINE WITH YOUR FACE. THE PLIERS COUL SLIP AND CAUSE INJURY.

Watertight Door Maintenance

Gasket replacement procedures

- Clean all debris and corrosion from the inside of the gasket channel.
  - For steel doors, a small rotary wire brush, chucked in an electric drill is effective for removing this corrosion.
  - For aluminum doors, sand the channel with a light grade of aluminum oxide cloth.

CAUTION: Do not use a rotary steel wire br
on aluminum doors

Watertight Door Maintenance

Gasket replacement procedures

- Prime the inside of the gasket channel with Formula 150 primer.
- When the top coat is dry, apply a top coat of Formula 151.

Watertight Door Maintenance

Installation - ZZ-R-765 Silicone

- Cut a single length of silicone gasket material to go around the door plus 1 inch.

NOTE:Make sure both ends are cut square

Watertight Door Maintenance

Installation - ZZ-R-765 Silicone (CONT'D)

- Apply silicone compound to the gasket.

CAUTION: Do not use petroleum products on the gasket.

Watertight Door Maintenance

Installation - ZZ-R-765 Silicone (CONT'D)

- Begin to install the gasket, beveled side toward the inside of the channel.
- Start at the top center of the closure.

NOTE: With the exception of scuttles, do not place the joint on a curved section of the door or hatch.

Watertight Door Maintenance

Installation - ZZ-R-765 Silicone (CONT'D)

- Squeeze the gasket and push it into the channel. While installing, apply back pressure to the gasket.

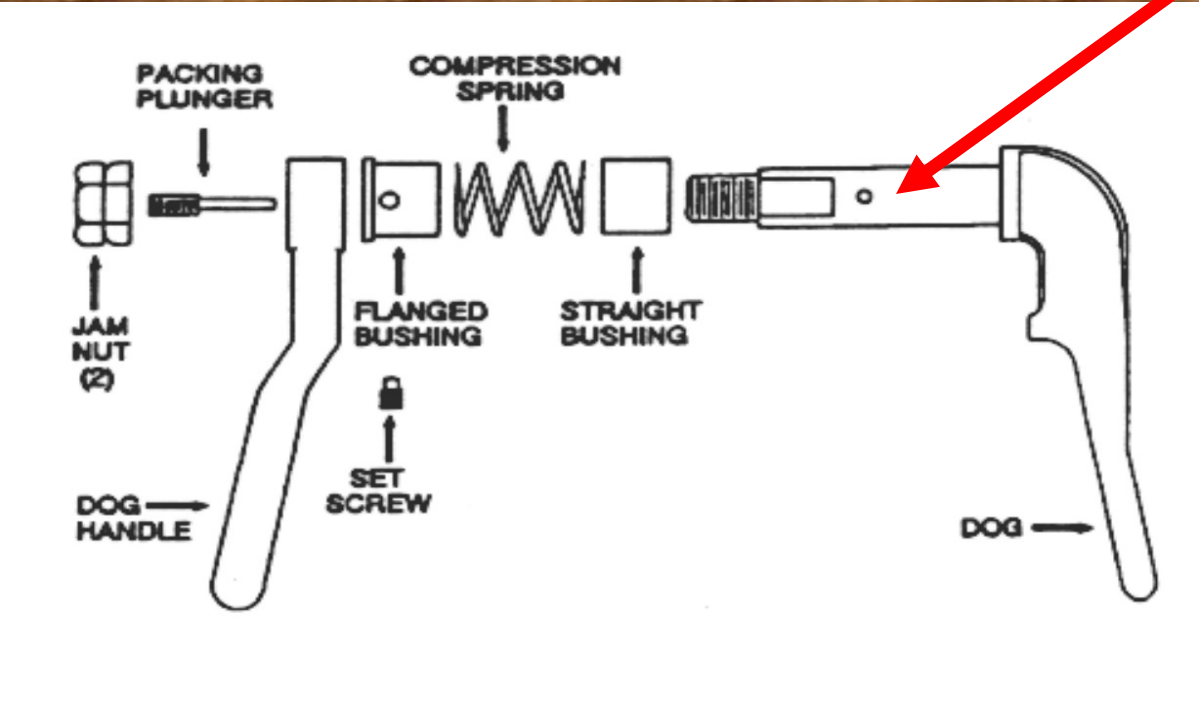
CAUTION: Be careful not to stretch the gasket.

- When arriving back at the gasket joint, force fit the extra 1 inch into the channel.

Watertight Door Maintenance

Dog Spindle Lubrication

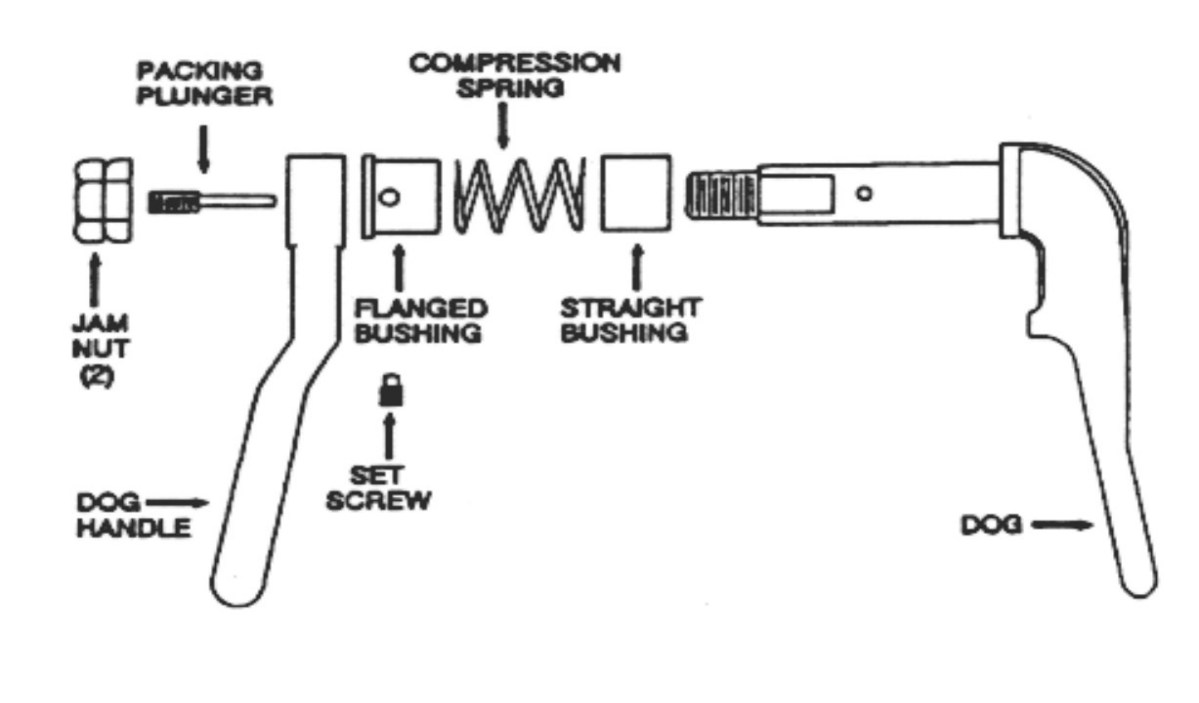
- Replace the string packing, which is used around the spindle.



Watertight Door Maintenance

Dog Spindle Lubrication

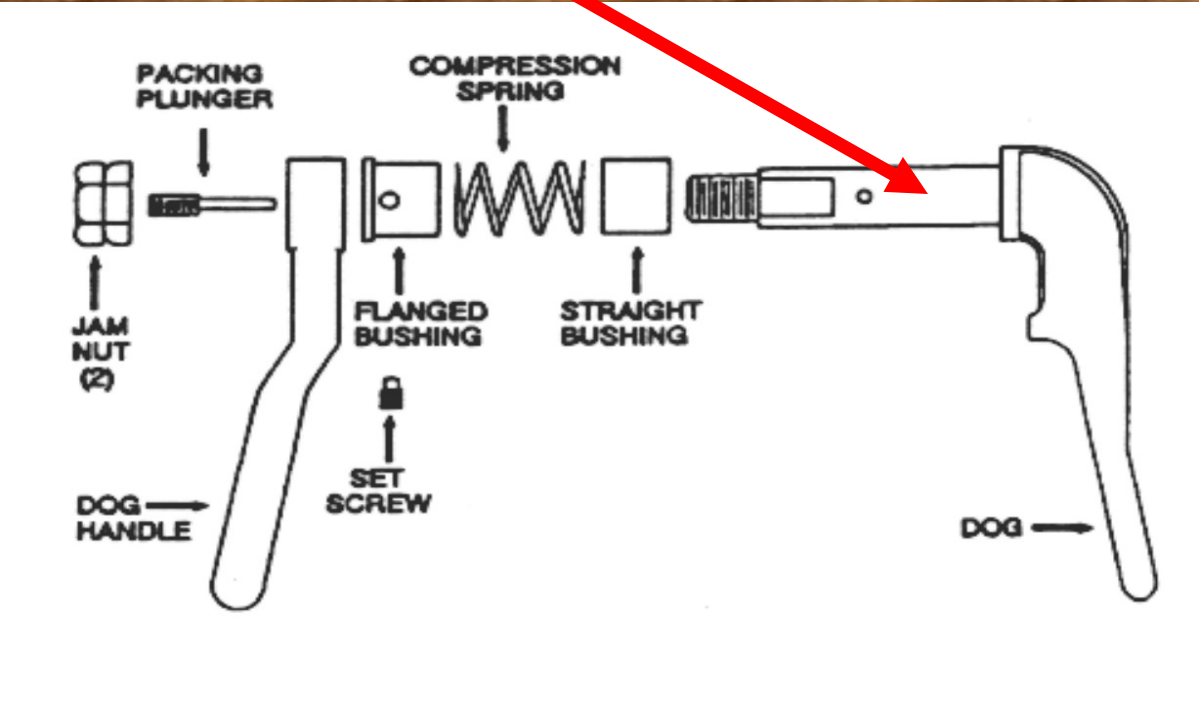
NOTE: Do not use string or stick packing on a closure that has self-lubricated bushings installed.



Watertight Door Maintenance

Dog Spindle Lubrication

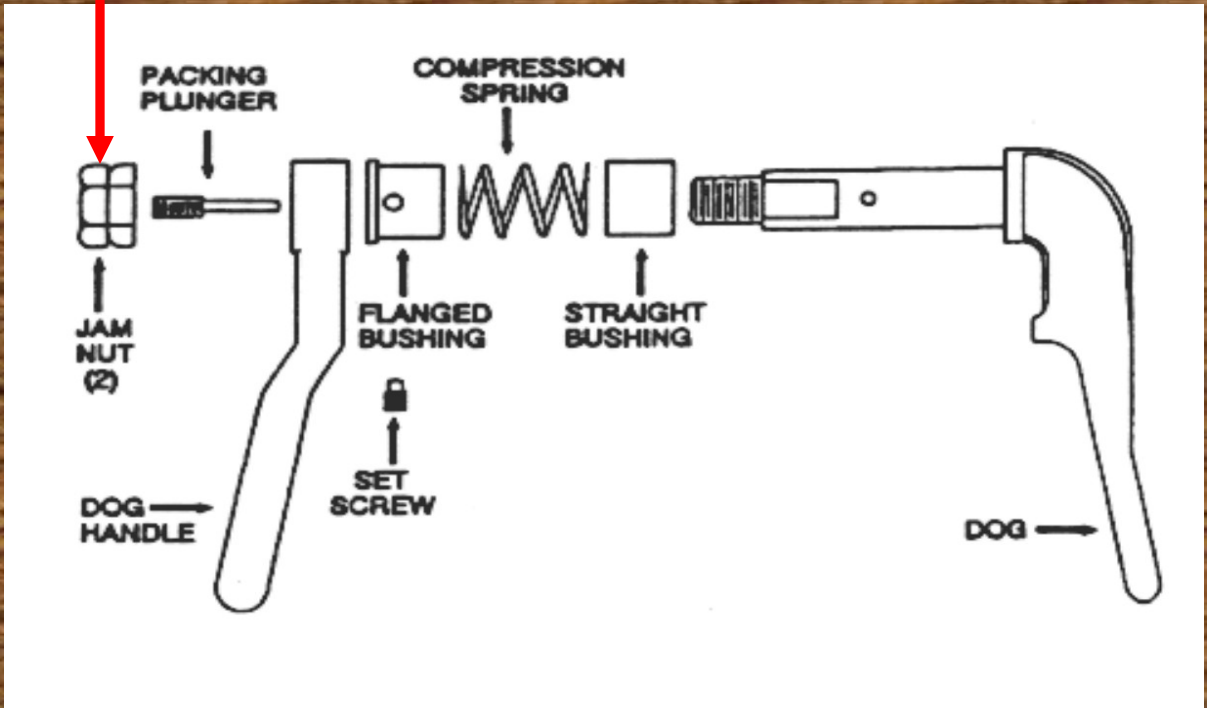
- Lubricate the shaft by applying a light coat of silicone compound.



Watertight Door Maintenance

Dog Spindle Lubrication

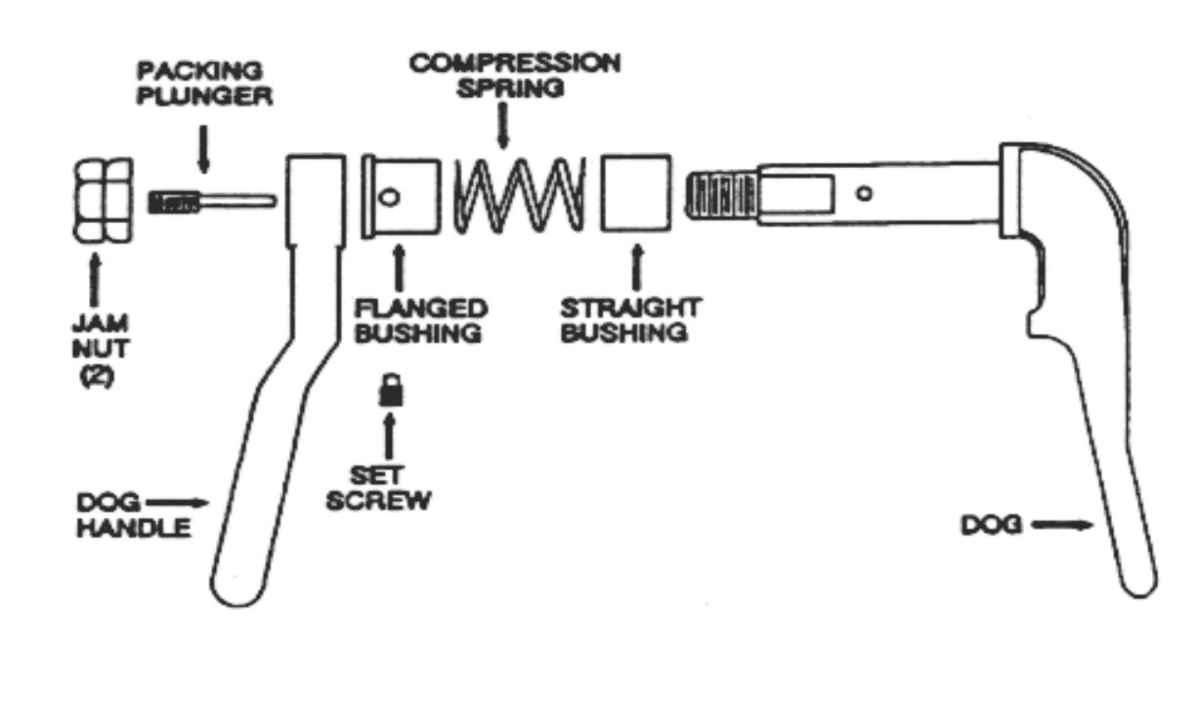
- Turn the dog nuts through the entire length of the spindle to ensure smooth operation.



Watertight Door Maintenance

Dog Spindle Lubrication

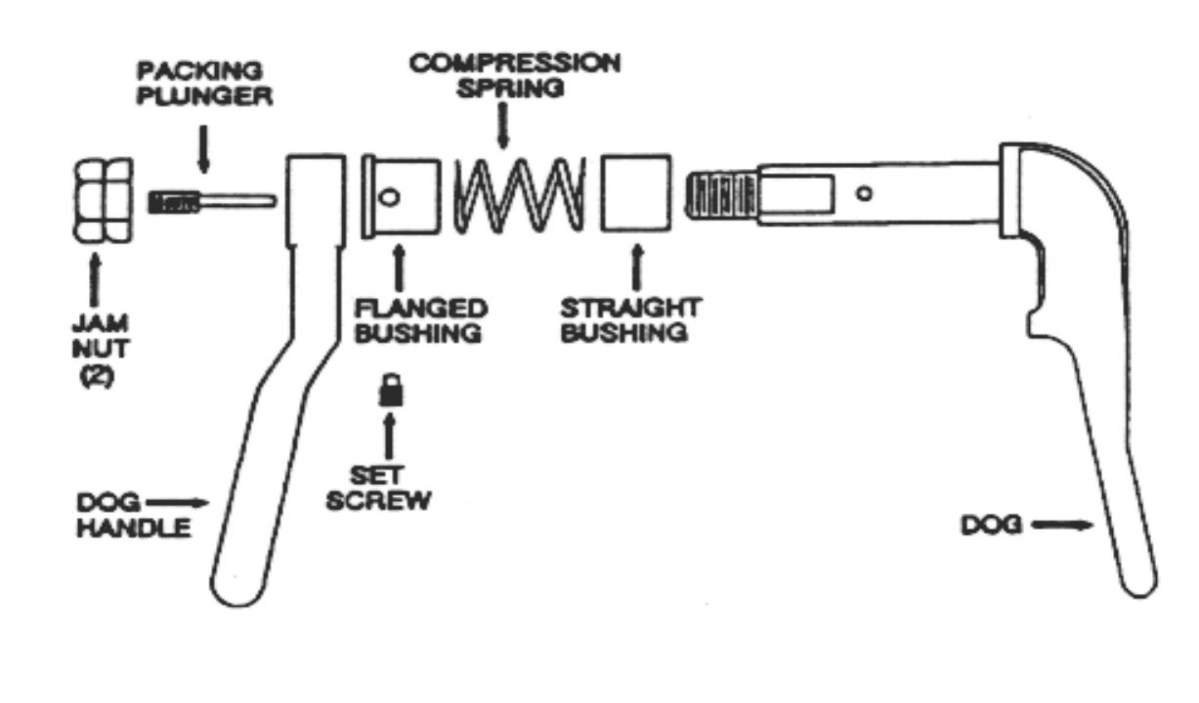
- Lubricate the remaining working parts and surfaces with a few drops of oil (2190)



Watertight Door Maintenance

Dog Spindle Lubrication

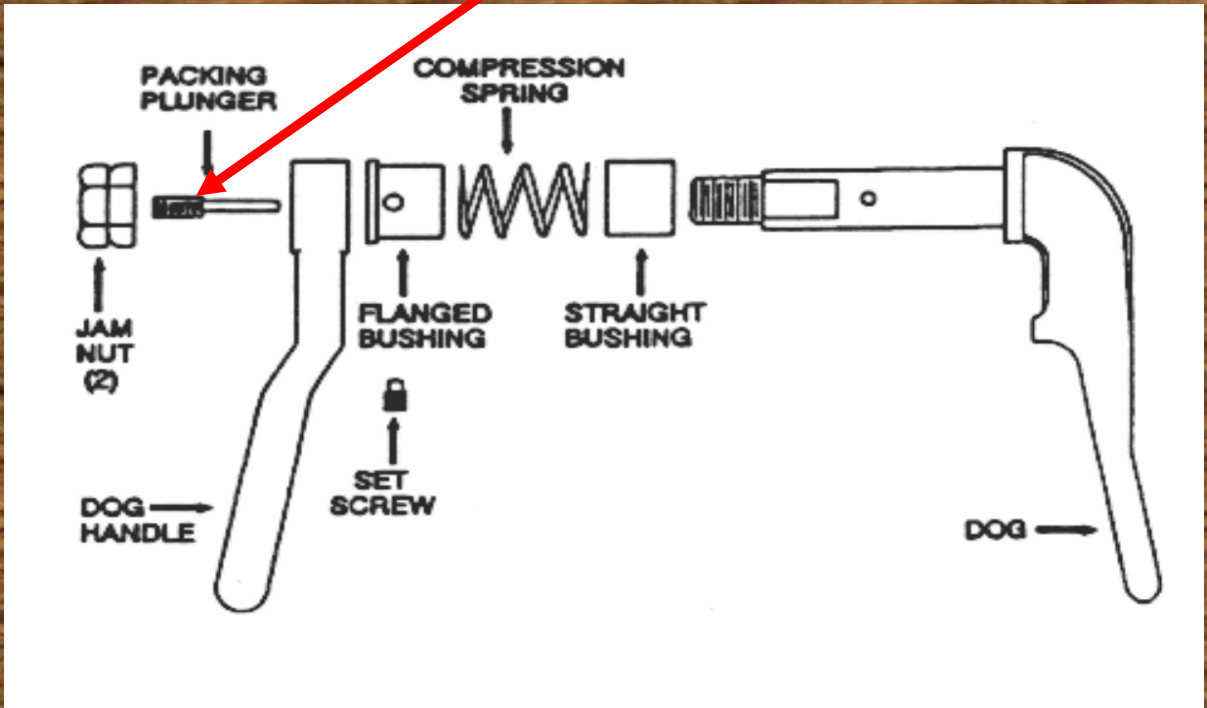
- Remove excess silicone
- Reassemble the dog assembly



Watertight Door Maintenance

Dog Spindle Lubrication

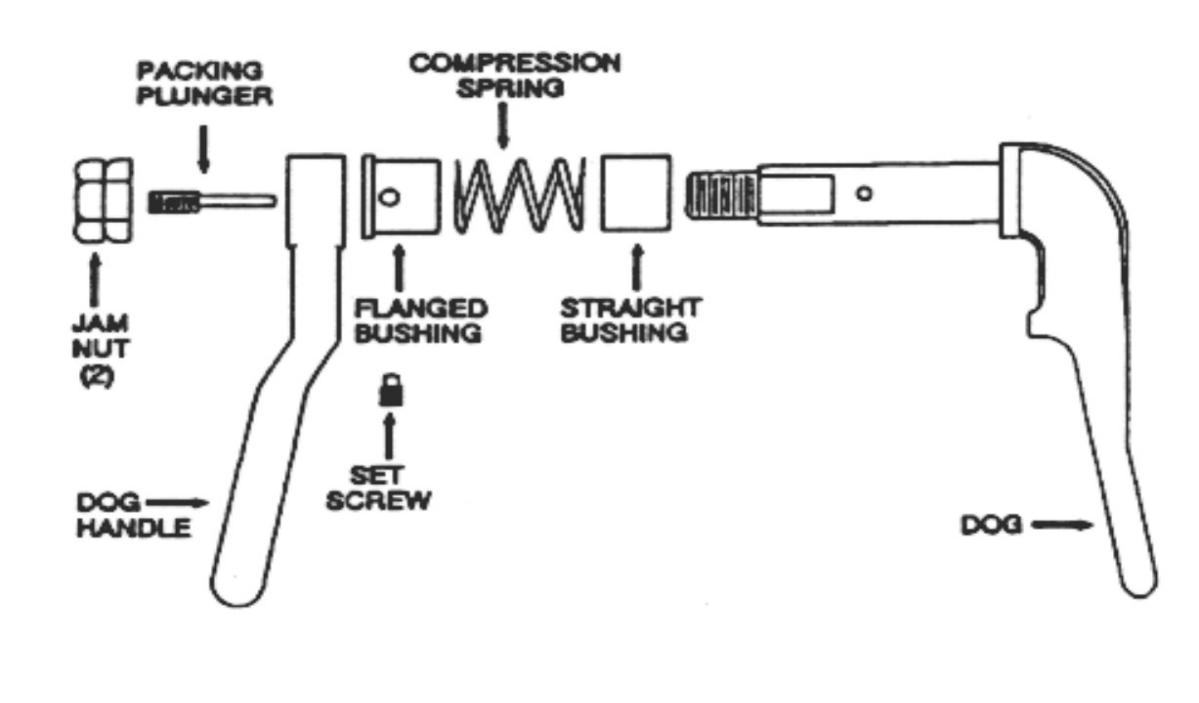
- Replace the stick packing and packing plungers.



Watertight Door Maintenance

Dog Spindle Lubrication

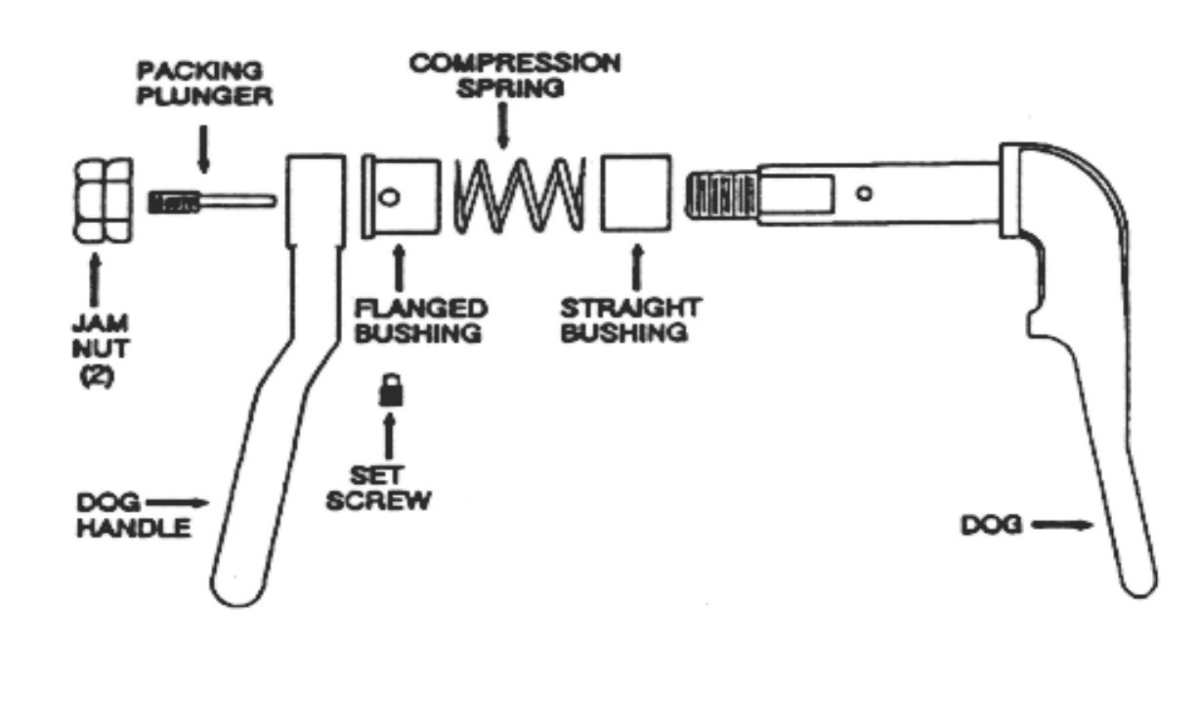
NOTE: Stick packing is used in conjunction with string packing to provide an air, gas and watertight seal arou dogging mechanism.



Watertight Door Maintenance

Dog Spindle Lubrication

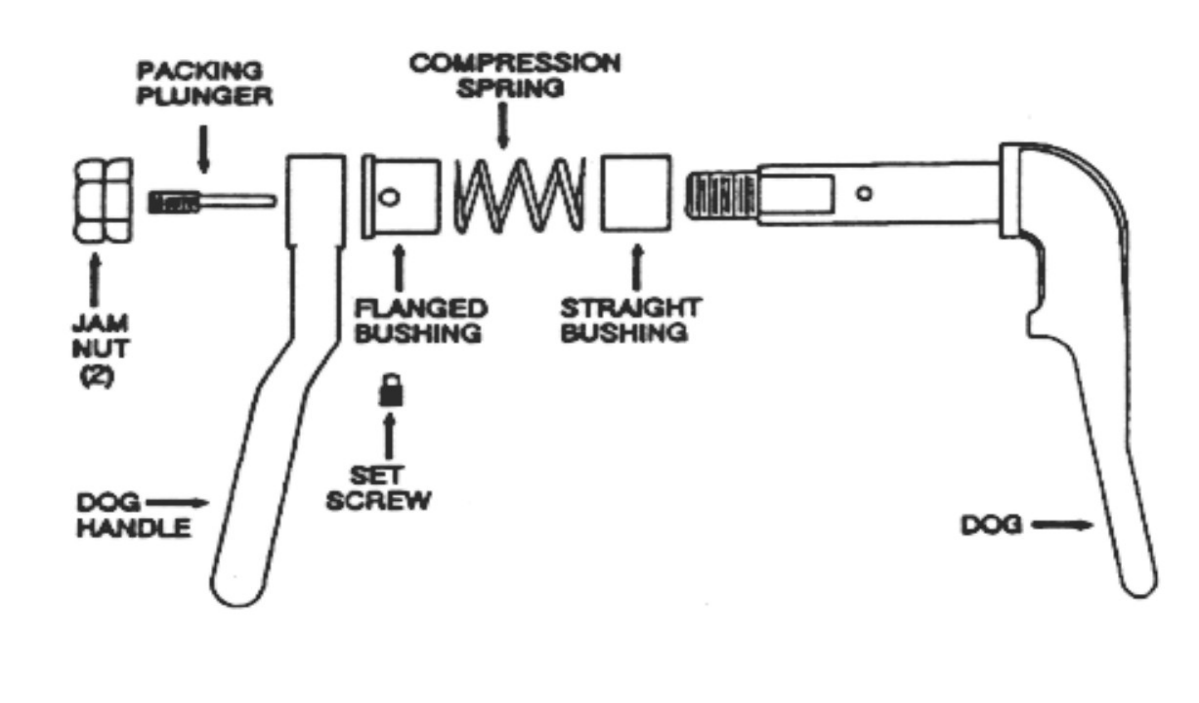
- After the packing plunger is removed from the spindle, insert the stick packing into the packing shaft opening.



Watertight Door Maintenance

Dog Spindle Lubrication

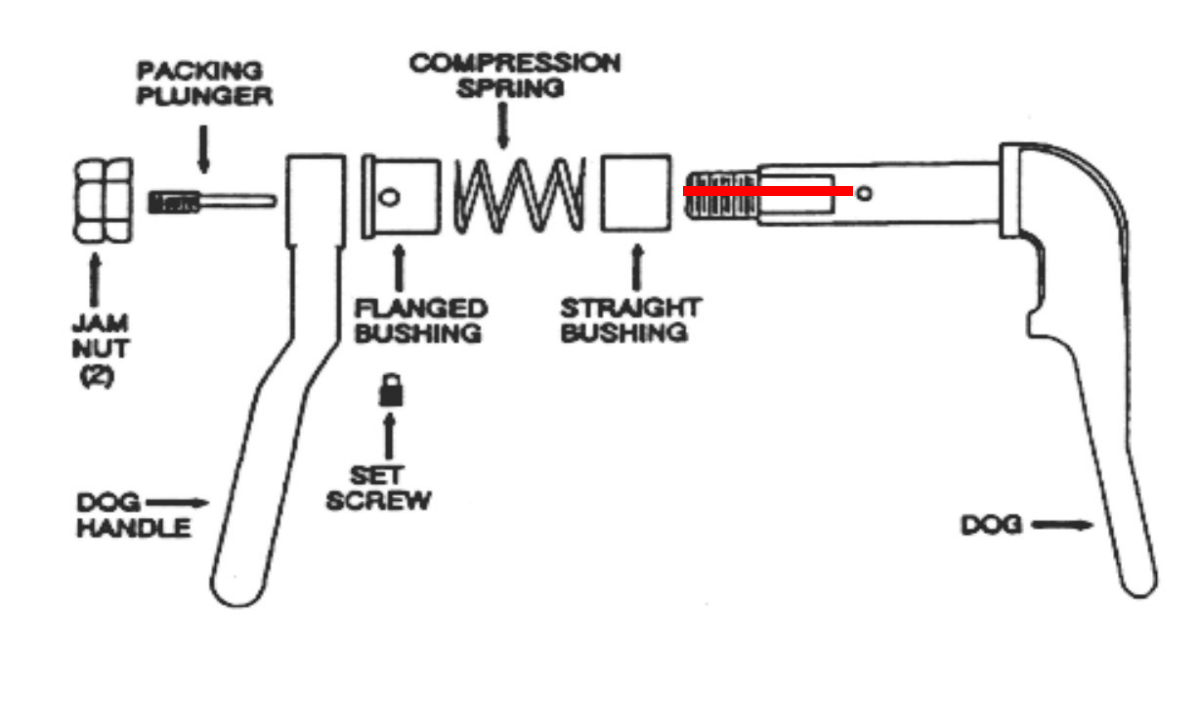
- Use a 1/4 inch diameter rod for pushing the stick packing deeper into the shaft opening before reinserting the plunger.



Watertight Door Maintenance

Dog Spindle Lubrication

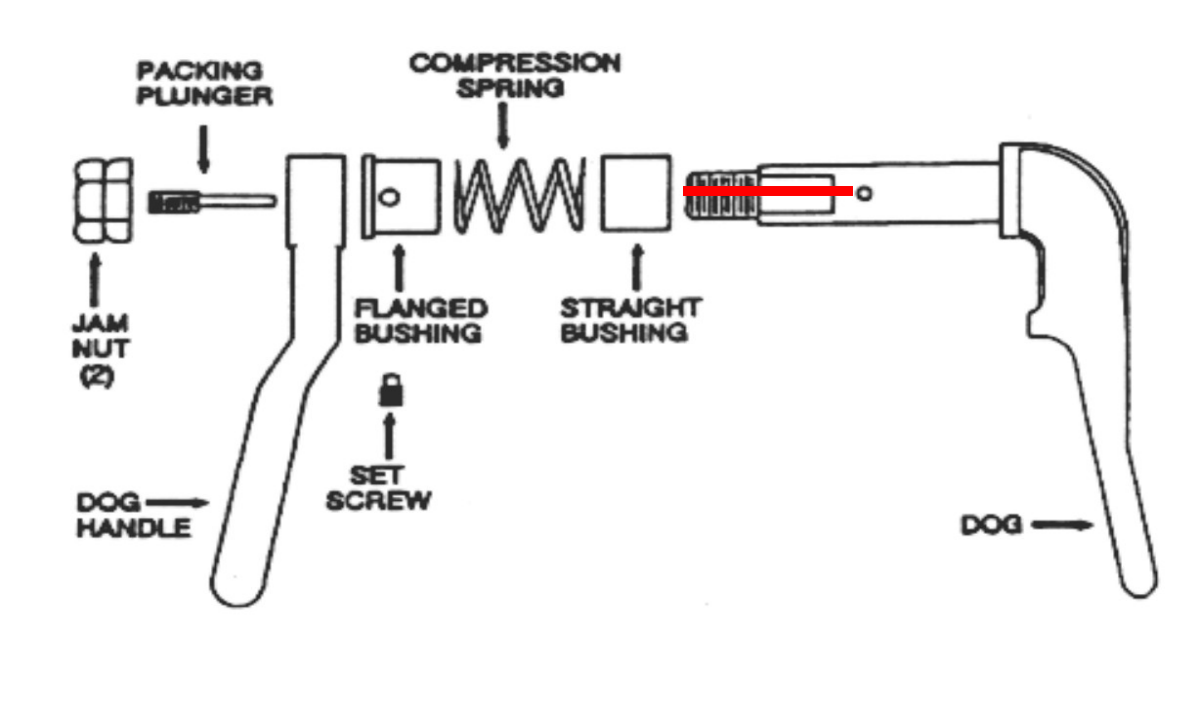
- Push the packing far enough into the shaft so that the plunger does not contact the packing while you are reinserting it.



Watertight Door Maintenance

Dog Spindle Lubrication

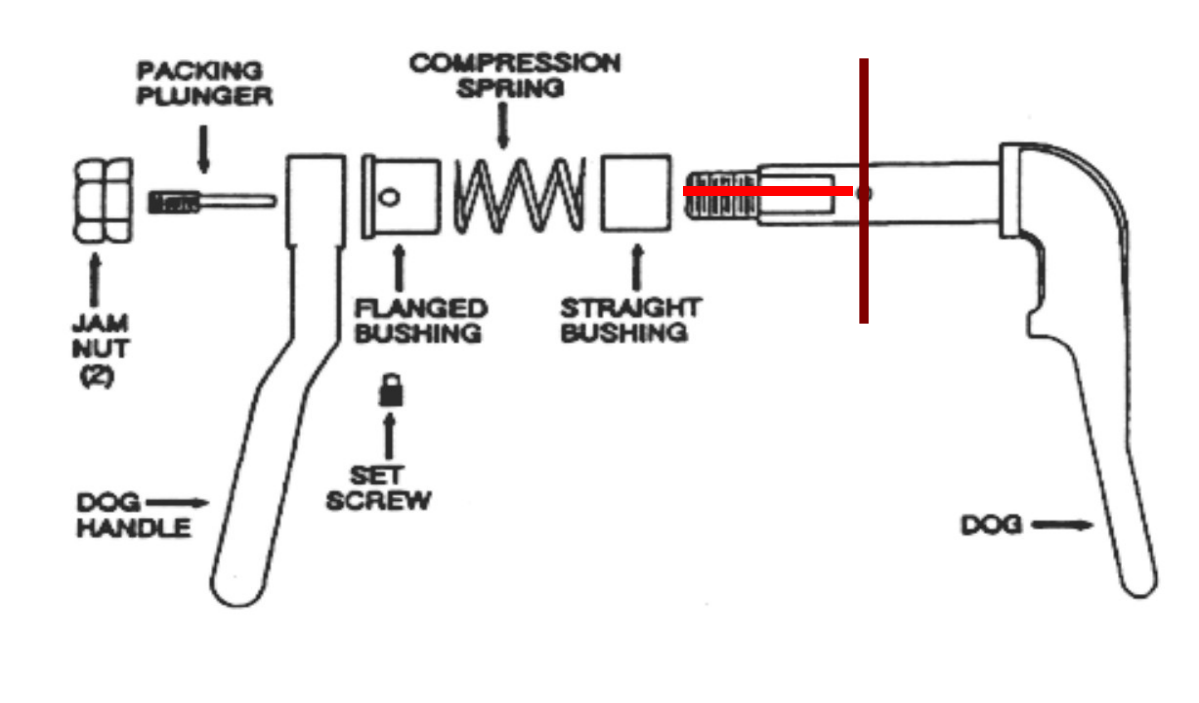
- Only use three sticks of stick packing in the spindle shaft.



Watertight Door Maintenance

Dog Spindle Lubrication

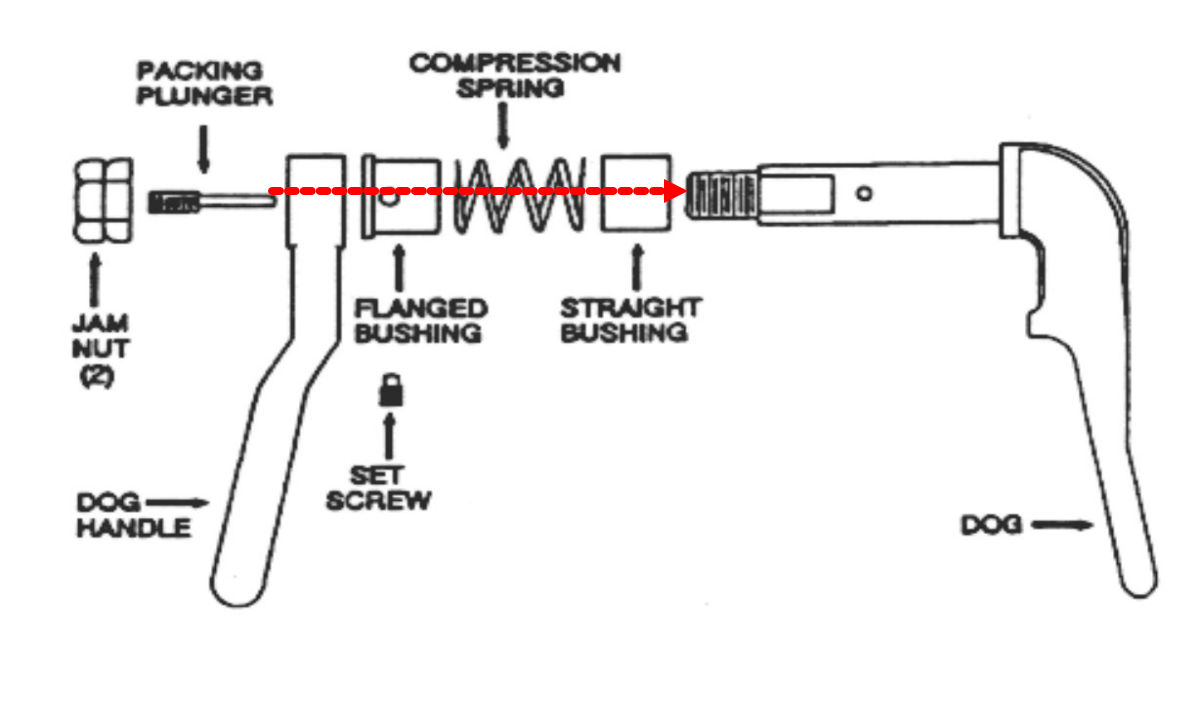
NOTE: If the plunger comes in contact with the packin threads are engaged, it can result in waste of some of stick packing.



Watertight Door Maintenance

Dog Spindle Lubrication

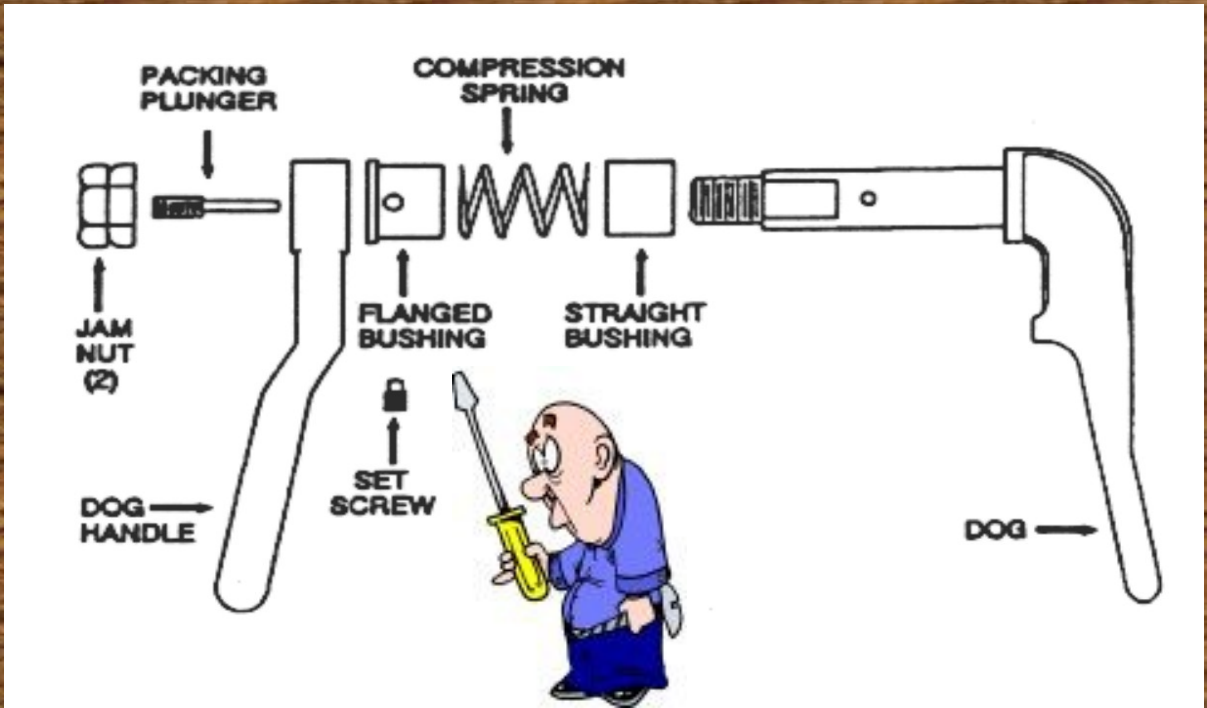
- Reinsert the packing plunger into the packing shaft opening.



Watertight Door Maintenance

Dog Spindle Lubrication

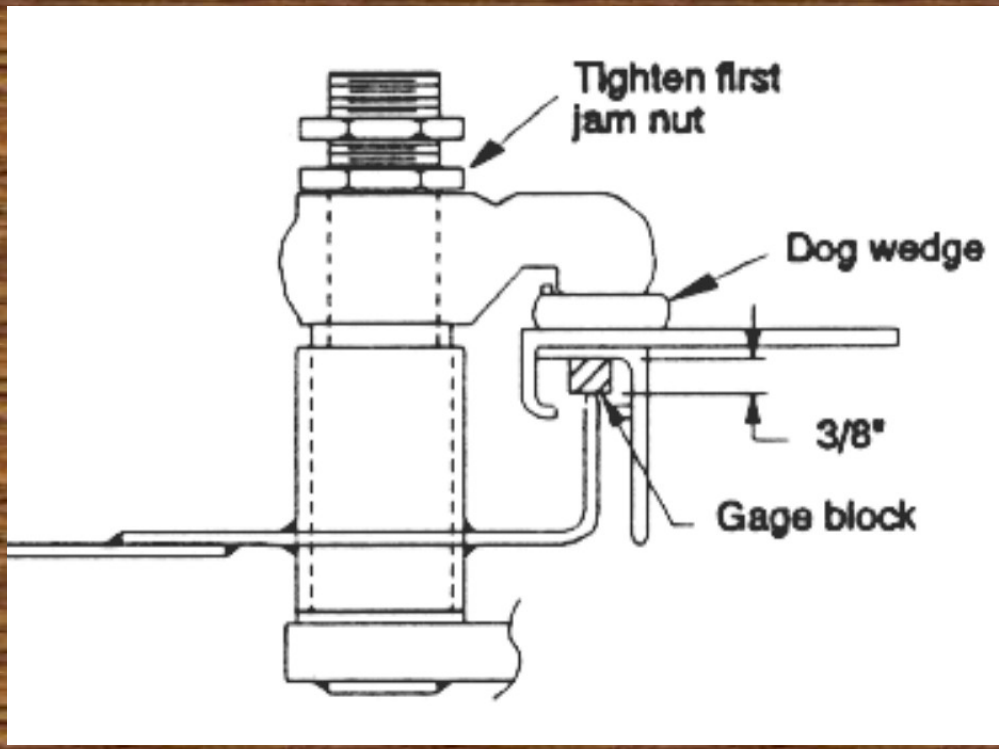
- Tighten the plunger with a screwdriver until excess packing appears around the spindle sleeve.



Watertight Door Maintenance

Dog Adjustment

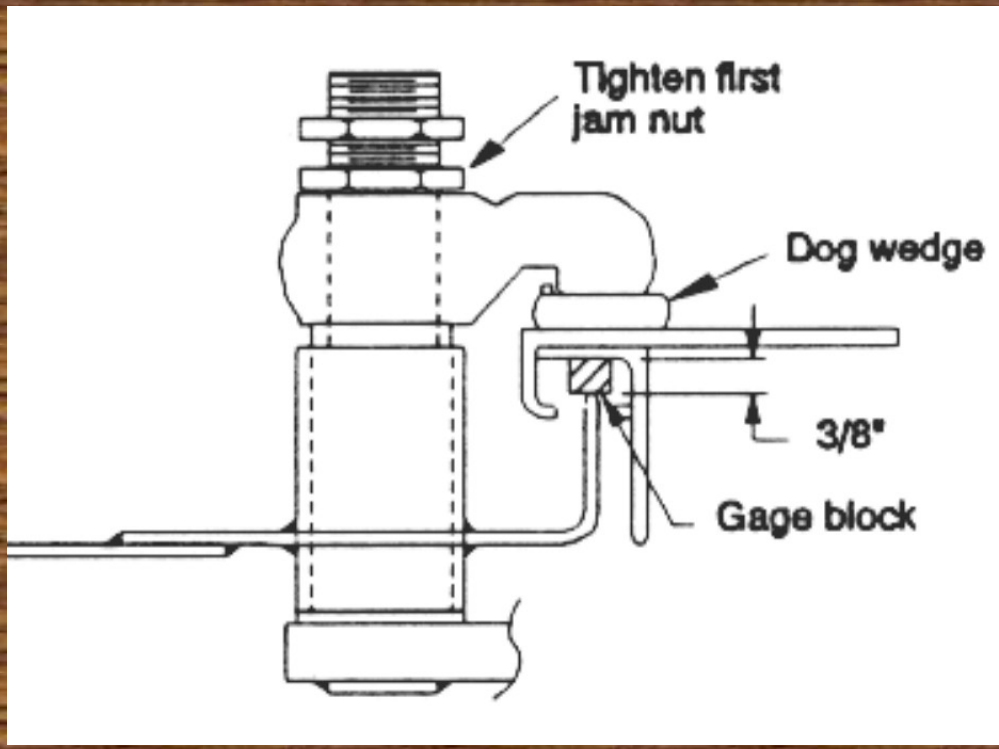
- Adjustment Method 1 (gasket removed)
  - Loosen all jam nuts or self locking nut.
  - Remove the existing gasket, if not already removed.
  - Place the 3/8 inch thick gage block in the gasket channel directly behind the dog wedge.



Watertight Door Maintenance

Dog Adjustment

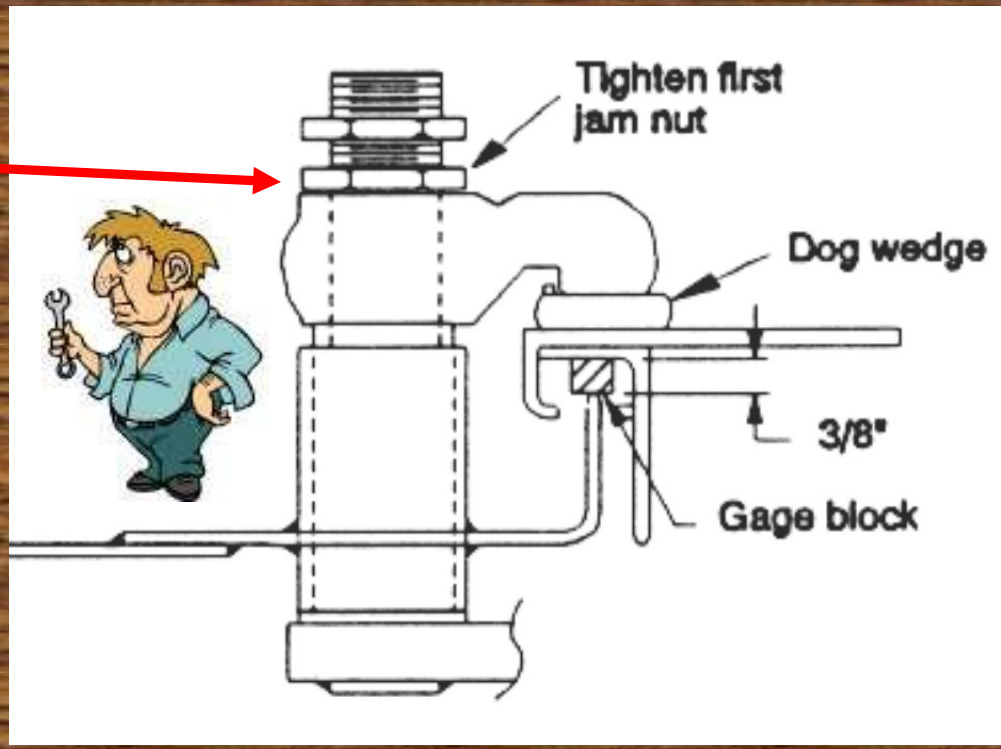
- Adjustment Method 1 (gasket removed)
  - Using two 1/2 inch long pieces of gasket material, secure the gage block in the gasket channel.
  - Close the door and dog it down.



Watertight Door Maintenance

Dog Adjustment

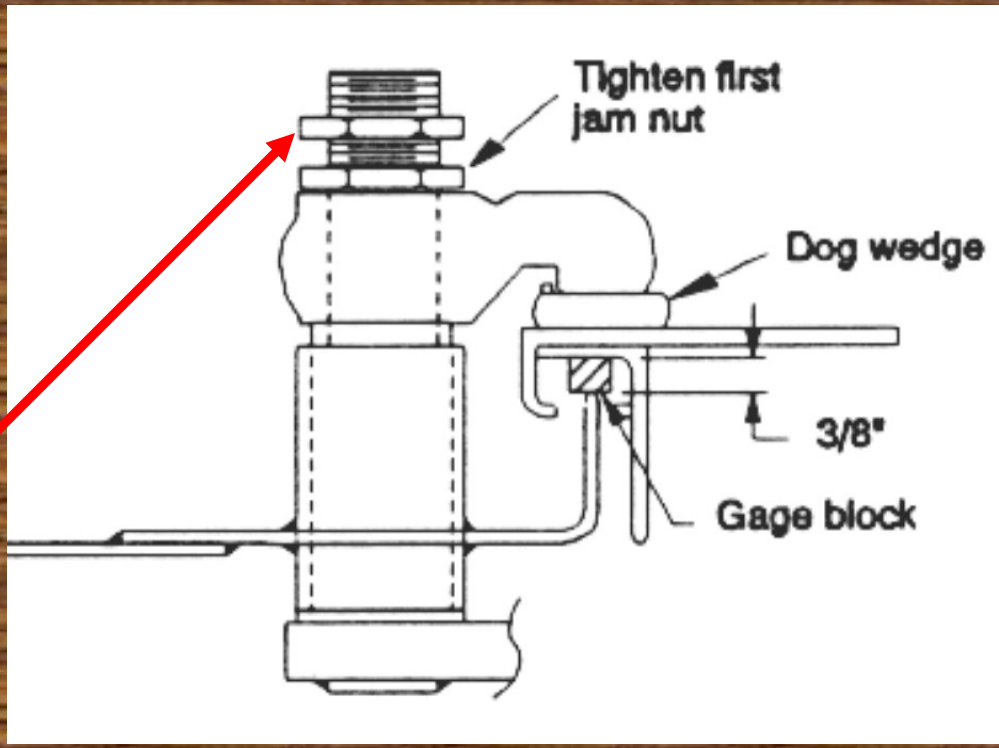
- Adjustment Method 1 (gasket removed)
  - Tighten the first jam nut or self locking nut until the knife edge hits hard against the 3/8 inch thick gage block.



Watertight Door Maintenance

Dog Adjustment

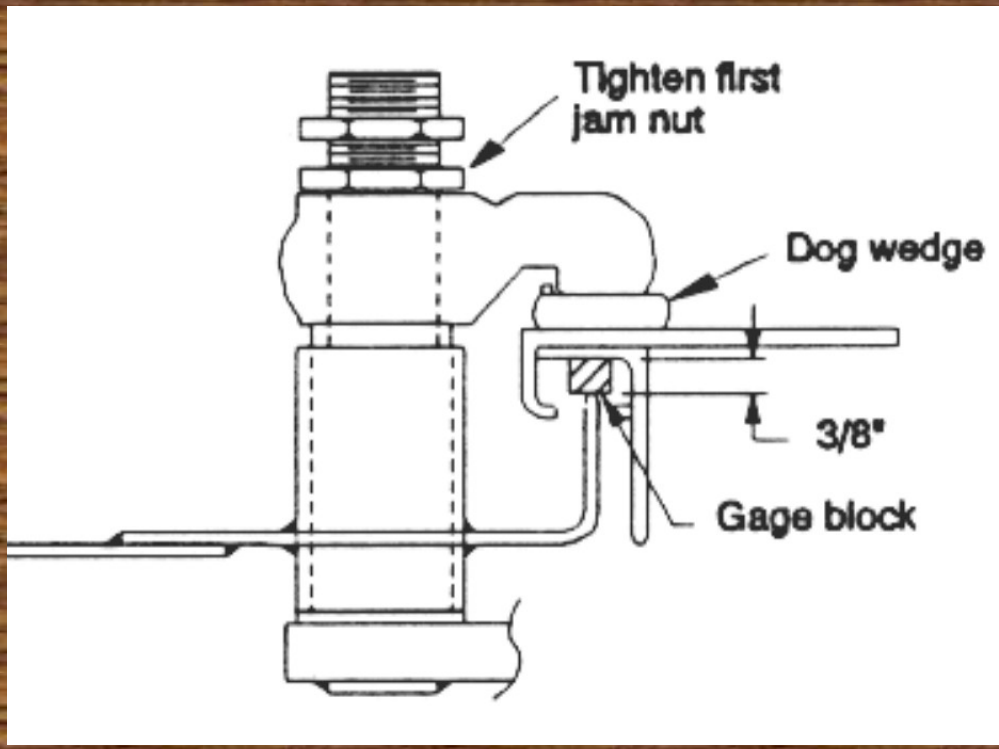
- Adjustment Method 1 (gasket removed)
  - Tighten the first jam nut or self locking nut until the knife edge hits hard against the 3/8 inch thick gage block.
  - Tighten the second jam nut very securely against the first jam nut while holding the first jam nut to prevent the first jam nut from moving.



Watertight Door Maintenance

Dog Adjustment

- Adjustment Method 1 (gasket removed)
  - Repeat steps for each dog.



Watertight Door Maintenance

Dog Adjustment

- Adjustment Method 2 (gasket installed)
  - Loosen all jam nuts or self locking nut.
  - Close the door, but do not dog it down.

Watertight Door Maintenance

Dog Adjustment

- Adjustment Method 2 (gasket installed)
  - Loosen all jam nuts or self locking nut.
  - Close the door, but do not dog it down.

NOTE:If there is warpage between the door panel the frame, the gasket will not contact the knife ed evenly. Start the dog alignment in the area where gasket first contacts the knife edge.

Watertight Door Maintenance

Dog Adjustment

- Adjustment Method 2 (gasket installed)
  - Insert a strip of paper between the gasket and the knife edge and dog the door.
  - Tighten the first jam nut or self locking nut down until the paper cannot be slid out from between the knife edge and the gasket dog. Make sure the dog is contacting the dog wedge.
  - For individually dogged doors, this requires two persons, one on either side of the door.
  - Tighten the first jam nut an additional 1-1/8 turn to achieve a 1/8 inch gasket compression.
  - Tighten the second jam nut securely against the first, as discussed during adjustment method 1 and conduct chalk test.

JOB SHEET 1-4-3

Quick Acting Watertight Door Maintenance Application

MRC S-5R

Watertight Hatch Inspection

MRC S-5R

Watertight Scuttle Inspection

JOB SHEET 1-4-4

Watertight Scuttle Inspection Application

Review & Summary

Review & Summary

1) Why should the DCPO look for paint, rust, and foreign matter on gaskets, knife edge & working parts?

Review & Summary

(Paint and rust causes the gasket not to seal / rust can cause parts to break)

Review & Summary

2) When conducting a chalk test, what should you be looking for and what does it tell you about the closure?

Review & Summary

(Continous chalk line on the gasket / warpage)

Review & Summary

3) When is it required to replace the gasket in any closure?

Review & Summary

(Not soft & pliable, has cracks, gap in gasket joint, permanent grove of 1/8”)

THE END